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10/748,098	12/30/2003	Byung Chul Cho	YPL-0070	6908

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CANTOR COLBURN, LLP
55 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

EXAMINER	
ZERVIGON, RUDY	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/748,098	CHO ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 November 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-3, and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watabe; Masahiro (US 5500256 A) in view of Murakami; Takeshi et al. (US 5,728,223 A). Watabe teaches:

i. A reaction chamber (12; Figure 3) for depositing a thin film, the reaction chamber (12; Figure 3) comprising: a reactor block (12a; Figure 3); a wafer (13; Figure 3) block (15; Figure 3) located inside the reactor block (12a; Figure 3); a top plate (12b; Figure 3) which covers the reactor block (12a; Figure 3) to maintain a predetermined pressure; a feeding unit (11, Figure 3) which supplies a first reactive gas (inside 3a; Figure 3) and a second reactive gas (inside 3b; Figure 3); a shower head (30; Figure 3), which is installed in the top plate (12b; Figure 3) and includes a plurality of first spray holes (4a; Figure 3) for spraying the first reactive gas (inside 3a; Figure 3) supplied from the feeding unit (11, Figure 3) on a wafer (13; Figure 3) and a plurality of second spray holes (4b; Figure 3) for spraying the second reactive gas (inside 3b; Figure 3) supplied from the feeding unit (11, Figure 3); the feeding unit (11, Figure 3) comprising: a feeding block (31; Figure 3) that is connected to the shower head (30; Figure 3); a distributing block (36; Figure 3) which is connected to a first gas supply line (3a; Figure 3) to uniformly distribute the first reactive gas (inside 3a; Figure 3) – claim 1

ii. Watabe's upper diffusion block (35; Figure 3) comprising: a upper difussion block (35; Figure 3) which is connected to Watabe's feeding block (31; Figure 3) and includes first feeding holes (conduits in 31a; Figure 3) which are respectively connected to Watabe's first gas transfer pipes (3a; Figure 3) and a second feeding hole (conduits in 31a; Figure 3) which is connected to Watabe's second gas transfer pipe (3b; Figure 3); a plurality of first main flow paths (1a; Figure 3) which are formed on Watabe's bottom of Watabe's upper difussion block (35; Figure 3), which are connected to Watabe's first feeding holes (4a,Figure 3), respectively, and are radially and symmetrically formed around Watabe's center of Watabe's upper difussion block (35; Figure 3) – claim 1

iii. Watabe's reaction chamber (12; Figure 3) of claim 1, wherein Watabe's first gas transfer pipes (3a; Figure 3) are symmetrically disposed between Watabe's feeding block (31; Figure 3) and Watabe's distributing block (36; Figure 3), as claimed by claim 2

iv. Watabe's reaction chamber (12; Figure 3) of claim 1, wherein Watabe's upper diffusion block (35; Figure 3), Watabe's intermediate diffusion block (31a; Figure 3), and Watabe's lower diffusion block (37, Figures 6, 8D; column 6, lines 38-65) are integrally formed (35; Figure 3), as claimed by claim 7

Watabe does not teach:

i. an intermediate diffusion block (31a; Figure 3) adhered to Watabe's bottom of Watabe's upper diffusion block (35; Figure 3), and a lower diffusion block (37, Figures 6, 8D; column 6, lines 38-65) adhered to the bottom of the intermediate diffusion block (31a; Figure 3), the intermediate diffusion block (31a; Figure 3) comprising: a plurality of second main flow paths, which are formed on the intermediate diffusion block (31a;

Figure 3) and respectively correspond to Watabe's first main flow paths (1a; Figure 3); a plurality of second sub-flow paths which are formed on the intermediate diffusion block (31a; Figure 3) and respectively correspond to Watabe's first sub-flow paths ; a plurality of first distributing holes which are formed at regular intervals in the second sub-flow paths and second main flow paths; and a second distributing hole connected to Watabe's second feeding hole (141; Figure 3,12; page 8, lines 20-26), a lower diffusion block (37, Figures 6, 8D; column 6, lines 38-65) comprising: a plurality of first spray holes connected to the first distributing holes, respectively, for spraying Watabe's first reactive gas (inside 3a; Figure 3) on Watabe's wafer (13; Figure 3); and a plurality of second spray holes formed between Watabe's first spray holes for spraying Watabe's second reactive gas (inside 3b; Figure 3) on Watabe's wafer (13; Figure 3) – claim 1

ii. two or more first gas transfer pipes (3a; Figure 3) which connect the feeding block (31; Figure 3) to the distributing block (36; Figure 3) – claim 1

iii. a plurality of first sub-flow paths, which are formed in Watabe's bottom of Watabe's upper difussion block (35; Figure 3) and extend perpendicularly from each of Watabe's first main flow paths (1a; Figure 3); and a second gas transfer pipe (3b; Figure 3) which is formed in the center of the feeding block (31; Figure 3) and connected to the second gas supply line (3b; Figure 3), the shower head (30; Figure 3) comprising an upper diffusion block (35; Figure 3) connected to the bottom of the feeding unit (11, Figure 3)

iv. Watabe's reaction chamber of claim 1, wherein a diffusion region having a plurality of convex portions and a plurality of concave portions is formed on the top surface of the

lower diffusion block, and the first spray holes are formed in the convex portions and thr second spray holes are formed in the concave portions, as claimed by claim 3

v. Watabe's reaction chamber (12; Figure 3) of claim 1, wherein each of the first sub-flow paths of Watabe's upper diffusion block (35; Figure 3) has the same shape as each of the second sub-flow paths of the intermediate diffusion block (31a; Figure 3), and each of the first main flow paths of Watabe's upper diffusion block (35; Figure 3) has the same shape as each of the second main flow paths of the intermediate diffusion block (31a; Figure 3), as claimed by claim 5

vi. Watabe's reaction chamber (12; Figure 3) of claim 1, wherein the number of Murakami's first feeding holes (4a,Figure 3) is proportional to each of the number of the first main flow paths and the number of the second main flow paths, as claimed by claim 6

Murakami teaches a wafer (13; Figure 3) processing apparatus (Figure 1) and process gas distribution plates (31-33 Figures 6, 8a-c; column 6; lines 38-65) including:

i. an intermediate diffusion block (32, Figures 6, 8B; column 6, lines 38-65) adhered to Murakami's bottom of Murakami's upper diffusion block (31, Figures 6, 8A; column 6, lines 38-65), and a lower diffusion block (37, Figures 6, 8D; column 6, lines 38-65) adhered to the bottom of the intermediate diffusion block (32, Figures 6, 8B; column 6, lines 38-65), the intermediate diffusion block (32, Figures 6, 8B; column 6, lines 38-65) comprising: a plurality of second main flow paths (main branch on 32, Figures 6, 8C; column 6, lines 38-65), which are formed on the intermediate diffusion block (32, Figures 6, 8B; column 6, lines 38-65) and respectively correspond to Murakami's first main flow paths (main branch on 31, Figures 6, 8A; column 6, lines 38-65); a plurality of second

sub-flow paths (perpedicular branch to main branch on 32, Figures 6, 8A; column 6, lines 38-65) which are formed on the intermediate diffusion block (32, Figures 6, 8B; column 6, lines 38-65) and respectively correspond to Murakami's first sub-flow paths (perpedicular branch to main branch on 31, Figures 6, 8A; column 6, lines 38-65); a plurality of first distributing holes (holes in 33, Figures 6, 8C; column 6, lines 38-65) which are formed at regular intervals in the second sub-flow paths (perpedicular branch to main branch on 32, Figures 6, 8A; column 6, lines 38-65) and second main flow paths (main branch on 32, Figures 6, 8C; column 6, lines 38-65); and a second distributing hole (24a, Figures 8A; column 6, lines 38-65) connected to Murakami's second feeding hole (24b, Figures 8B; column 6, lines 38-65), a lower diffusion block (37, Figures 6, 8D; column 6, lines 38-65) comprising: a plurality of first spray holes (42, Figure 6; column 6, lines 38-65) connected to the first distributing holes (holes in 33, Figures 6, 8C; column 6, lines 38-65), respectively, for spraying Murakami's first reactive gas on Murakami's wafer; and a plurality of second spray holes (43,44, Figure 6; column 6, lines 38-65) formed between Murakami's first spray holes (42, Figure 6; column 6, lines 38-65) for spraying Murakami's second reactive gas on Murakami's wafer – claim 1

ii. Murakami's reaction chamber of claim 1, wherein a diffusion region (37; Figure 6) having a plurality of convex portions (pieces between 44; Figure 6) and a plurality of concave portions (44; Figure 6) is formed on Murakami's top surface of Murakami's lower diffusion block (37, Figures 6, 8D; column 6, lines 38-65), and Murakami's first spray holes (42, Figure 6; column 6, lines 38-65) are formed in Murakami's convex portions (pieces between 44; Figure 6) and Murakami's second spray holes (43,44, Figure

6; column 6, lines 38-65) are formed in Murakami's concave portions (44; Figure 6), as claimed by claim 3

iii. Murakami's reaction chamber of claim 1, wherein each of Murakami's first sub-flow paths (perpedicular branch to main branch on 31, Figures 6, 8A; column 6, lines 38-65) of Murakami's upper diffusion block (31, Figures 6, 8A; column 6, lines 38-65) has Murakami's same shape as each of the second sub-flow paths (perpedicular branch to main branch on 32, Figures 6, 8A; column 6, lines 38-65) of Murakami's intermediate diffusion block (32, Figures 6, 8B; column 6, lines 38-65), and each of Murakami's first main flow paths (main branch on 31, Figures 6, 8A; column 6, lines 38-65) of Murakami's upper diffusion block (31, Figures 6, 8A; column 6, lines 38-65) has Murakami's same shape as each of the second main flow paths (main branch on 32, Figures 6, 8C; column 6, lines 38-65) of the intermediate diffusion block (32, Figures 6, 8B; column 6, lines 38-65), as claimed by claim 5

iv. Murakami's reaction chamber of claim 1, wherein Murakami's number of Murakami's first feeding holes (35; Figure 6) is proportional to each of Murakami's number of Murakami's first main flow paths (main branch on 31, Figures 6, 8A; column 6, lines 38-65) and Murakami's number of Murakami's second main flow paths (main branch on 32, Figures 6, 8C; column 6, lines 38-65), as claimed by claim 6

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Watabe's gas distribution components with Murakami's gas distribution components (Figure 6).

Motivation to replace Watabe's gas distribution components (Figure 6) with Murakami's gas distribution components is for providing for a uniform flow of process gasses over a wide area of substrates resulting in uniform films over wide areas of substrates as taught by Murakami (column 8; lines 18-46).

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watabe; Masahiro (US 5500256 A) and Murakami; Takeshi et al. (US 5,728,223 A) in view of Hayakawa; Yukihiro et al. (US 5,447,568 A). Watabe and Murakami are discussed above. Watabe and Murakami do not teach Murakami's reaction chamber of claim 1, wherein a temperature sensor and a heater are mounted on Murakami's feeding block (31; Figure 3) to control Murakami's temperature of Murakami's reactive gases (121, 122; Figure 3; page 8, lines 20-26), as claimed by claim 4.

Hayakawa teaches a wafer (13; Figure 3) processing apparatus (Figure 10) including a gas distribution plate (3306; Figure 10,11) with a heater (3307; Figure 11) controlled by temperature sensors (4001; Figure 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Hayakawa's heated and controlled (4000) gas distribution plate (3306; Figure 10,11) to the apparatus of Watabe and Murakami.

Motivation to add Hayakawa's heated and controlled gas distribution plate (3306; Figure 10,11) to the apparatus of Watabe and Murakami is for controlling the feed rate of gas as taught by Hayakawa (column 13; lines 43-48).

Response to Arguments

4. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new grounds of rejection.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.